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Abstract

In this paper I explore the relationship between the production and the value of Big Data. In particular I examine the concept of social media 'prosumption'—which has predominantly been theorized from a Marxist, political economic perspective—to consider what other forms of value Big Data have, imbricated with their often speculative economic value. I take the example of social media firms in their early stages of operation to suggest that, since these firms do not necessarily generate revenue, data collected through user contributions do not always realize economic value, at least in a Marxist sense, and that, in addition to their speculative value, these data have value beyond an economic valence. Instead I argue that in addition to their function as systems for accumulation, social media and their associated data have an affective value, related closely to their economic value, and demonstrate the efficacy of social media as systems designed for the appropriation and circulation of user attention.

Keywords

Affect, Big Data, production, prosumption, social media, value

Introduction

Critical commentary discussing the question of precisely how and why Big Data have value tends to focus either on their epistemological value or ethical value, both in general (Andrejevic, 2014; Burns, 2014) and in the context of their use in academic research (Goodchild, 2013). Yet these inquiries often focus on Big Data as an already-constituted object, and it is less common for scholarly research to examine the relationship between the production of data, digital forms of labor, and the value of those data (though see Beer and Burrows, 2013; Kitchin, 2014). The response to or assumptions about Big Data, too often logical and positivist (e.g. Anderson, 2008), is that they have value because they are seen as unmediated evidence of phenomena and therefore immediately available for analysis. Yet, as Wilson (2015) notes, Big Data could be viewed more critically as phenomena themselves, rather than as evidence of existing phenomena. By focusing on how Big Data are collected, that is, how they are produced, researchers are more likely to critically grasp their ethical and epistemological value, closely connected to their economic exchange-value, as in the revenue models of social and digital media (Fuchs, 2014a), in the production of digital subjectivities (Cheney-Lippold, 2011), and in new models of data- and algorithm-driven governance (Amoore, 2011).

The relationship between the production and value of Big Data has been approached most directly by researchers studying the concept of 'prosumption' and its political economy (Fuchs, 2010). Prosumption is a term used to refer to the merging of the forms of production and consumption in late capitalism (Humphreys and Grayson, 2008; Ritzer, 2014), and as a way to characterize social media use (Fuchs, 2011).[1]

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Users both produce content in the form of data and metadata, and consume a social media service. Since users are both active producers and consumers of the service and its associated data, they are said to be 'prosumers' of social media (Burston et al., 2010). However, these studies focus on prosumption as a form of digital labor through a Marxist analysis; data are rarely taken as the object of analysis, and value is assumed to be always and only exchange-value in the revenue strategies of high-profile social media firms such as Facebook and Twitter (Fuchs, 2014b).

Since the function of Big Data is not always or only to realize economic value in the revenue strategies of social media firms, it is important to ask, still through close attention to their production, what other kinds of value do data have? Prior to monetization, data may also indicate users' attention toward and degree of investment in a platform, thus demonstrating a platform's efficacy as a system of attention capture. The value of Big Data in these cases can be said to be affective, or 'pre-economic,' as well as connoting a speculative, economic value. Writing on prosumption is useful in this context, and an important complement and counterpoint to some of the already existing writing on the collection and production of Big Data, because of the critical links already being drawn in this literature between the production of data and their value. In this paper therefore, drawing on research with social media firms in San Francisco, I argue that in addition to their function as systems of accumulation, social media and the data 'prosumed' alongside them can be constructively thought of as systems for the appropriation and circulation of user attention, or as an affective apparatus of capture.

Affective value, interwoven with speculative economic value, is produced alongside and directly located in the mode of production particular to social media (Banning, 2016). I define affect as a structure of feeling or infrastructure of desire (Anderson, 2015; Berlant, 2011) in which data contributed by prosumers demonstrate a persuasive command over attention, sentiment, attachment, and feeling. Affective structures are coterminous with economic production, which is important given the changing status of value and the commodity in late capitalism that are often informational, emotional, and immanent to, rather than distinct from, the labor-power of individuals (Hochschild, 1983; Jhally and Livant, 1986; Spivak, 1985). In the case of digital media, and other 'watching,' audience-based, and unwaged forms of 'work,' the commodity (e.g. viewership figures or user data) could not exist without the continued attention of users, thus rendering the ability to reliably continue to command prosumer attention a valuable one. Social power and the apparatus of affective attention-capture sit alongside the previously (and continuing) dominant capitalist technology of surplus-value procurement: the wage function. As a technology compelling others to work, the wage has been effective, but expensive from the point of view of the capitalist. Television and social media, through the production of viewership figures and Big Data models represent an attempt to create different technologies that compel others to 'work,' by creating platforms designed as systems of affective investment, and thus implicating questions of affect, power, domination, and desire in the mode of production. What is at stake in considering Big Data production in the case of social media from the point of view of both economic and affective value is a more thorough understanding of how neoliberal forms of reason reproduce particular forms of digital work as normative, hegemonic, and acceptable. It means considering how production becomes a 'mode' in the first place, through appropriative methods that are not in themselves solely economic (Deleuze and Guattari, 1987). In this view, early-stage social media firms contribute to the normalization of unpaid forms of labor (Terranova, 2004), the social expectation of the gifting of personal information in exchange for 'free' digital media use under terms that users cannot negotiate (Peacock, 2014), and systems of biopolitical governance undergirded by ever more nuanced systems of calculation and measurement (Crampton, 2014; Leszczynski, 2012).

In the next section, I examine how other writers have considered the relationship between the production and value of Big Data. In section three, I examine how production and value have been rethought in the transition to post-Fordist and digitally mediated forms of capitalism, and take up Big Data production in the case of prosumption to detail how writers such as Fuchs currently theorize user-generated content in terms of Marx's labor theory of value. In section four, I extend these discussions to consider how prosumers create data for early-stage social media platforms that are prior to or entirely without the realization of economic value. Drawing on interviews with entrepreneurs in San Francisco's digital media sector, and through the writing of Laclau and Mouffe (1985), I suggest that early-stage social media 'startups' are speculative (unrealized) systems that seek to produce affective circuits for the capture of user attention and data. In this sense I locate affect directly in the infrastructure of economic production, in which affects and the economic are interwoven and mutually constitutive. This affective value is not-yet exchange-value from a Marxist perspective, and distinct from speculative value, yet is by no means incidental to economic production, and can be viewed as an initial form of appropriation or affective 'capture' upon which production must be predicated.

The production of Big Data

In this section, I examine research on the production of Big Data, pointing to how different conceptualizations of production affect our understanding of the value of Big Data. Kitchin (2014) describes three main sources of Big Data. 'Directed data' are forms of surveillance such as the national census, CCTV, and information collected for taxation purposes. 'Automated data' describe the ambient collection of data as an annex to other activities, including the internet of things, RFID tagging, smart meters, supermarket 'loyalty' cards, and other 'logjects' (Kitchin and Dodge, 2011). Finally, 'volunteered data' are collected through user contributions, including social media sites, and crowdsourced projects such as OpenStreetMap and Wikipedia. Prosumption falls into this latter description of volunteered data, but is also included in the category of automated data, since a great deal of metadata are collected in excess of cognizant user contributions.

Thatcher (2014), drawing on empirical research with designers and developers, puts forward the concepts of 'digital footprints' and 'digital fumes.' The former refers to data collected by actions and behavior already being undertaken to which a 'layer' of active or passive digital observation and recording is added. The latter refers to data collected through the use of digital applications, accounting for the activity of prosumption that fits between Kitchin's 'automated' and 'volunteered' data as described above. Thatcher's 'footprints' and 'fumes' imply a more personal dimension to Big Data collection and production than Kitchin's above distinctions, while they also highlight the epistemological problems and dangers inherent in treating the selective data-traces of subjective human activity as objective arbiters of worldly phenomena. Thatcher's terms emphasize the excessive and potentially invasive subjective qualities of Big Data and their collection.

Within these distinctions—locating prosumption between and including 'automated' and 'volunteered' Big Data—there remains great variety to social media use and prosumption in terms of the production of Big Data. Discussions from the point of view of Big Data analyses are, I think, better placed to make this point than those discussing the value of prosumption, which, as I examine in the next section, tend to have a Marxist, production-oriented focus, usually examining only 'authoritative' and highly successful examples such as Facebook and Twitter (e.g. Fuchs, 2009). Various forms of digital labor exist beyond examples pertaining to social media use (see Irani, 2015; Lehdonvitra, 2016), and because of this economic analyses of prosumption that focus only on social media elide important differences between this and other forms of digital prosumption.

Beyond social media, Beer and Burrows (2013) attempt to schematize different kinds of digital data 'archives' into four main categories, all produced, at least in part, through the activity of prosumption. 'Transactional archives' include online stores such as Amazon and Spotify, which collect automated data through search and purchasing functions, allowing these sites to target advertising, build user profiles, and select for users products they may want to purchase. 'Archives of the everyday' include 'confessional' social media sites such as Facebook and Twitter. 'Opinion' or 'viewpoint archives' include blogging platforms and individually hosted blogs, which tend to be single-authored, journalistic and long-form. Finally, 'crowdsourced archives' are volunteer-driven, freely editable sites such as OpenStreetMap and Wikipedia. In this latter example, users contribute data, the site's main content, and metadata through the creation of tags that enable their content to be more accessible to others through the site's search function.

Despite Beer and Burrows' schematic, there is overlap between the four categories they outline and there are many digital forms of labor that escape these categories. Comment, ratings, and review systems percolate through all four categories, as do games and gamification. Some digital media models that pertain directly to revenue generation, such as subscription, direct payment, and 'freemium' service, depend upon paid clients and customers, rather than, or in addition to, the unpaid contributions of users. Additionally, the extent to which spatial 'check-in' based social media, such as Swarm and Foursquare, dating or hook-up applications, and 'on-demand' transactional media (such as Uber and TaskRabbit), fit into the archives mentioned above remains open for debate. Though Beer and Burrows are not making an economic intervention per se, and therefore leave the question of non-economic definitions of the value of Big Data open, their discussion reinforces the facts that (1) Big Data collected through digital prosumption is not a unified or singular activity, and (2) any attempt to discuss the value of Big Data (however the term 'value' is defined) must account for different kinds of digital media use and production. Social media, the example I take in this paper, is defined as only one particular kind of archive in Beer and Burrows' model; thus, alternative, perhaps platform-specific explanations (Barreneche and Wilken, 2015) of value must be given for the collection of data involved in the production of other kinds of digital archives.

Gregg (2015) conceptualizes the production of Big Data from an affective point of view, through the material and somatic notion of 'data sweat.' This term highlights the relationship between data

and the digitally augmented body, the latter seen as an excessive, leaking entity, unable to completely control the porosity and permeability of the data that serves as evidence for its motility. Data sweat is a sign of vitality that defies attempts at bodily control or curtailment, subtle evidence of the body's presence, and an unwanted secretion that leaves a trace that can be measured, read, collected, organized, and aggregated. Gregg draws attention to the almost incontrovertible injunction for participation in a digital economy. We cannot always choose, spatially or temporally, and we do not necessarily have knowledge of all the data that we 'sweat.' Gregg (2015: 45) underlines the relationship between the materiality of data production as an ambient or unknowing form of labor through her use of the term "sweat equity" denoting the lack of control over our own digital labor. Data have become the visceral sign that our bodies are perpetually, persistently, and permanently at work (albeit only barely) in a digital economy. At stake in this claim is a conceptualization of data as having value in terms of how we think about embodiment, subjectivity, privacy, democracy, governmentality, and participation as much as economic value.

Big Data produced or 'given' through prosumption are typically unstructured data and require sorting, cleaning, and aggregating. As I shall outline, this point is particularly contentious from the point of view of their economic value—do unstructured, unsorted raw data have value prior to their management and organization? The implications of this question are not restricted to the economic value of data, but extend to the status of the user's unpaid labor, and the question of their 'exploitation.' In Big Data research, the question and definition of 'value' is generally treated far more capaciously, and with far more ambivalence and ambiguity than in the debates surrounding the topic of prosumption. In academic discourse on Big Data, value is a question not just of economy, but also of epistemology; affect, subjectivity and power; and of governmentality (Crawford et al., 2015). Value in the case of prosumption is treated overwhelmingly in a Marxist sense, or as a question explicitly for political economy to 'solve.' Before considering examples that point to the affective value of Big Data and prosumption in digital media firms that do not necessarily realize the value of user 'labor,' I first consider the changing conceptualizations of value in late capitalism. While not exhaustive, particularly on the question of value in general, this research is instructive, since the term 'value' does often imply economic value, and while emphasizing the cultural significance of Big Data, this should not undermine their economic import.

Rethinking the production and value of Big Data

The inter-determination and mutual constitution of economic with other forms of value (whether they be social, cultural, affective, epistemological, etc.) has been long acknowledged, though not always engaged with thoroughly. For example, Marx (1973 [1867]) insists that value is first and foremost *social* value, and Nietzsche (2014 [1887]) outlines the dependence of normative moral values on economic relations such as debt through forms of shame, guilt, and personal responsibility. Deleuze and Guattari (1983) draw these connections more closely, suggesting that economic production is part of more general production of the social involving the interrelationship of psychic repression with the mode of production. These remarks remain salient today due to the increasing generalization of the debt ('personal credit') as a form of payment (Lazzarato, 2012), the financialization of household savings (Marazzi, 2007) and financial and existential precarity as an emerging regime of governmentality (Lorey, 2015). Berlant (2011) and Konings (2015) critique the concepts of 'exploitation' and 'alienation' as explanations for the class-based oppression of workers by capital, which imply a disaffection of the individual. Instead, they suggest that capitalism *necessarily* involves personal, social, and affective identification with the mode of production. As Lash (2007) notes, the explanatory concepts of hegemony and ideology have been critiqued through a 'post-hegemonic' language that includes Foucault's (1978) writing on disciplinary power and biopolitics, as well as feminist writing on the gendered division of labor, the economics of affect, and infrastructures of desire (Ahmed, 2004). Capitalism is a system of intimacy that is proximate to, rather than 'disembedded' from, the social (Grossberg, 2010a, 2010b), and involves the production of meanings, aspirations, and promises (albeit often cruel and empty ones) of reciprocity and attachment, in which the social and the economic are always interwoven.

The imbrication of social and economic value has become clearer in post-Fordist and neoliberal capitalism (though was no less relevant prior to those shifts), with the growing importance of the financial and service sectors, closely connected to the rise of digital technologies and media. Workers in service sectors often perform 'emotional labor' as the main component of their work (Hochschild, 1983), and 'commodities' are no longer discrete objects readily distinguishable from the laboring activity itself. 'Commodities' as a form of service are ephemeral and immanent to labor-power, leading some authors to label labor in late capitalism as 'affective' (Hardt, 1999), or 'immaterial'

(Hardt and Negri, 2000; Negri, 1999), noting the increasingly informational character of both commodities and the mode of production itself. Yet, these categories have been rightly critiqued for being vague and general, and for eliding real discrepancies between different kinds of work (Gill and Pratt, 2008). The relative decline of industrial production in the global North has complicated earlier understandings of value, and, as with the concept of prosumption, writers have sought alternative explanations for the relationship between production and value (Spivak, 1985). Research has connected value to 'watching' television audiences (Jhally and Livant, 1986), the command of consumer attention (Stiegler, 2010), sentimentality and brand recognition (Arvidsson, 2012), and the 'general intellect,' a communicative and linguistic power immanent to labor (Virno, 2004).

Early-stage social media 'startup' firms working toward Big Data based revenue models provide an important exploration into these changing understandings of production and value. Early-stage firms often do not have a validated revenue model or reliable user-base and they depend on personal, crowdsourced, or speculative investor capital to continue development. They have a high likelihood of abatement and failure, or, less frequently, acquisition by larger firms. In these cases, and in a similar manner to Jhally and Livant's (1986) analysis of television audiences, we reach the limit of a solely production-oriented analysis, since audience viewership figures and prosumer content are not necessarily or immediately commodities in Marx's (1976) definition. Commodities are constituted by a dual contradiction or antagonism between their qualitative use-value (the socially necessary function connoting the consumer's need or desire to purchase the product) and quantitative exchange-value (measured by the amount of socially necessary labor time invested in it by the worker). To be defined as a commodity, exchange-value must also be realized as a form of revenue; a product must be sold on the market and converted back into M', resulting in a return on the initial investment advanced by the capitalist (Marx, 1978: 391).

Use- and exchange-value presuppose and constitutively require one another, yet are non-transferrable, oppositional, and contradictory characteristics of the commodity. In a social media enterprise, there is no guarantee of either the social necessity of the data 'product' (use-value), or the realization of surplus-value in the figure of M' at the point of resale (exchange-value). Though data on user activity are collected, and represent a structural component of social media's speculative revenue model, their immediate use-value at early stages of operation is ambiguous, their exchange-value remains unrealized, and thus their status as a commodity under a strictly Marxist definition is questionable. Since the social media platform's power to command investor capital is based on the continued investment of prosumer surplus-labor, the 'product' is not the commodity for sale, but the guarantee that the platform will continue to command user-attention. As in the emotional labor described by Hochschild, dead labor is not objectified in a 'finished' commodity in the case of social media, but instead living labor-power is objectified directly and continuously in a form of production immanent to the data-product itself. Data and the platform retain value only on the condition that users continue to prosume, since a platform without users has a far more questionable set of use-values for advertisers (thus also making dubious the capacity of that product to effectively realize an exchange-value without depreciation), irrespective of the amount of data already collected.

Despite the mutual constitution of the economic and the social, much of the writing surrounding prosumption and digital labor has focused on solely economic explanations for social media use, such as the applicability of Marx's labor theory of value to the unpaid prosumption of ad-supported social media platforms such as Facebook and Twitter. The tenet of Marx's (1976: 709) theory that research on prosumption is concerned with is the concept of surplus-value, that under capitalism workers are paid less than the actual value of the labor-time they expend. Workers are paid only for the content of time required for them to reproduce their circumstances of work, yet are expected to work beyond that time, to generate a surplus for the capitalist. Employers can only realize a surplus (and thereby generate a profit) if a difference exists between the wage and the actual value of labor-time, that is, if workers are underpaid. In the context of social media, Fuchs (2014a, 2014b) argues that Marx's labor theory of value can be applied to understand how social media firms realize value. In this view, users contribute content in the form of posts, likes, clicks, photo, video uploads, and so on. This content is legally owned by the platform, not the users, which, based on the aggregated contributions of hundreds of thousands of users, can be organized and sorted to produce large data sets, access to targeted portions of which are sold to advertising and marketing firms. In Fuchs' understanding, ad-supported social media makes most or all of its revenue through allowing third parties access to user data at a cost, leading Fuchs to suggest that prosumers are laborers, unpaid for their time spent using social media, alienated from their data, and exploited since the company who owns the platform generates profit from their labor without remuneration.

Writers who dispute Fuchs' analysis claim that he misinterprets the labor theory of value, and has an idealist and totalizing critique of social media use. Comor (2015) argues that prosumer labor is not

necessarily indicative of value, since, as noted above, unrealized value is not value, at least in Marx's writing. Since, for example, Facebook's data are sorted, packaged, and made available by the firm's waged employees, and not by their unpaid prosumers, it is this wage-labor for Comor that produces value, not prosumer labor. In Comor's critique, only packaged Big Data have value, whereas raw, unstructured data generated by prosumers do not (yet) have value. Others highlight the important role of speculative forms of investment and financial capital in the political economy of social media (Arvidsson and Colleoni, 2012; Jin and Feenberg, 2015). For these authors, value is realized in financial markets rather than through a more straightforward commodity-based production model.

Most saliently, Robinson (2015) notes the discrepancies between production, circulation, and realization in Marx's analysis—value produced in one time and place may be realized in another at an additional cost derived from the need to circulate that value. Social media firms make money through reducing the circulation costs for advertising and marketing firms, thus realizing value already produced in other spatiotemporal economic contexts. The point is not necessarily that prosumer data do not have value that may be realized, but that social media should be viewed in the broader context of a global economy that consists in economic activities located beyond those solely in the realm of production. These points suggest that Fuchs' production-oriented explanation of value is not capacious enough. Yet, though by no means exhaustive, Marx's ideas have utmost relevance to studies of Big Data, their production, and their value. User activity as a form of labor remains a significant component in the political economy of social media, and it should be included in explanations, but as one of many revenue-generating factors (Andrejevic, 2015; Banks and Deuze, 2009). Indeed, that prosumer data *can* realize value and be sold as a commodity should not be in question, but that is by no means the whole story in the political economy of social media such as Facebook and Twitter, or other forms of social media in general.

Prosumption and the production of Big Data through social media use have implications beyond the economic. This is especially pertinent when revenue is not generated and therefore, from a Marxist perspective at least, user-generated data are not commodities and do not have exchange-value. If we suggest that raw data have value that is not only economic, precisely how should we conceptualize their collection and value? Zajc (2015) has noted that user involvement, especially prior to the realization of value, might be thought of less in terms of labor and more in terms of subjectivity and interpellation. Therefore, these data have 'value' as evidence of how individuals and populations are made susceptible to disciplinary power and biopolitical forms of governance (Foucault, 1978). As users become more machine readable, inseparable from the data collected about them, writers like Deleuze (1992) have expressed concerns that individuals will be reduced to 'dividuals,' managed and governed through data-based evaluation and categorization (see also Foucault, 2008).

Data are not just collected to generate revenue, they can also demonstrate the 'attachment' users feel toward a platform, their likelihood to continue using it, and the kinds of behavior they perpetuate through its use. In the next section I suggest a model for thinking through the function of prosumer data that neither depends on their realization of value, nor relegates these data to the status of 'speculative' value, yet is not incidental to their economic function as revenue. Instead I suggest from an affective point of view that prosumption and the collection of user data are indicative of the production of affective attachments to particular kinds of unpaid work.

Locating affect in the infrastructure of (Big Data) production

''We wonder though, what else happens to [...] data other than it being used to extract value out of personal details'' (Beer and Burrows, 2013: 56).

Early-stage digital media firms collect data to measure user retention, interaction, and engagement, yet user-generated data at these stages do not always realize value if these firms do not generate revenue. Those that I interviewed often said that they collected data on ''everything,'' that is, as many measurable facets of user activity as possible, even if only on the assumption that these data might be useful later, though they focused on important metrics that they could quote in pitches, demo events, and other meetings to demonstrate to investors the viability of the firm's platform. In each of the examples of early-stage social media firms in this section, data are 'big' insofar as they are high in velocity and variety, and aim to be exhaustive and fine-grained, but, since the number of users at early stages is likely to be few, these data are not necessarily huge in volume (Kitchin, 2014: 68). 'Successful' social media firms may receive investment before data are monetized, while unsuccessful firms, though attracting users and collecting data on their activity, may fail outright before generating revenue, precluding the characterization of data as a commodity in Marxist terms of use- and exchange-value. In this section I suggest an alternative explanation for the value of data that is not strictly economic, yet does not contradict economic explanations given above. I suggest instead that these data have an affective value, and

demonstrate the capacity of a firm to evoke user-attachment to a product or service, while providing for investors a speculative guarantee, or secure promise of a future return.

Examples of the collection of data prior to the generation of any revenue are common for social media firms, though not necessarily include 'authoritative' examples like Facebook and Twitter that Fuchs and others discussing prosumption use most frequently. Though Facebook made nearly $400,000 in its first year of business in 2004 (Tsotsis, 2012), this is by no means the norm for other social media firms. Snapchat after two years of operation had received over $175 million in venture funding, yet generated no revenue (Large, 2014). Facebook is an important example because of its sheer number of active users, but it is an extreme outlier from the point of view of the number of firms that are attempting to replicate its high-growth, ad-based social media model. Examining the role that data play in social media firms in general, that is, in examples that could be described as not-yet-successful, failing, or failed firms, and prior to that data's realization of economic value, is important both in our evaluation of 'prosumption' as an economic concept and considerations of what other kinds of value these data have.

Engineers and entrepreneurs working at these earlier-stage firms confirmed in interviews that they were not collecting data to generate revenue. As an interviewee working for company one[2] stated, firms often work through "trying to get big and then figure out monetization." He said in regard to his own firm, "we're measuring a lot of things and setting a lot of targets, but the bottom line is we want 1,000 users when we launch, [and] we want 10,000 users after three months." This entrepreneur had not yet launched his product, but had received an investment of US$200,000, and eventually hoped to generate revenue through a 'freemium' model in which users could upgrade from a free service by paying a monthly subscription. Though this entrepreneur said he was "measuring a lot of things," connoting the variety of data collected, in this case the relevant data for use in pitches and demos with investors were on retention, user growth, and the number of recommendations users sent to their friends to encourage them to also use the application. This entrepreneur and prospective investors were thus not interested in the immediate ability of the platform to generate revenue, but in the collection of these Big Data demonstrate the number of users his application would have at launch and that their numbers would continue to grow quickly month over month.

Another entrepreneur working for company two[3] considered crowdfunding "as a community building exercise," before talking to investors, "because [the application] is so community oriented it's something people can get behind." Crowdfunding would offer this entrepreneur a source of advertising to generate positive attention for her product, as well as a source of financing. Speculating on the kinds of data she would need when she spoke with investors she said, "we would be showing them [. . .] downloads, daily active users, in this case probably weekly and monthly active users [. . .] some metrics for viral spread, [. . .] all these social validation things." Again, in this case, data would be collected continuously on user activity, but for the purposes of raising money, this entrepreneur would be using particular aspects of this Big Data model. This entrepreneur was also considering a freemium model for her application, as in the case of company one, but would only be able to implement this model after the collection of Big Data that could demonstrate, in the entrepreneur's words, "social validation," rather than revenue.

Another interviewee, working for company three[4] suggested that the relevant data collected on user activity were "engagement and retention metrics." He said that while seeking an early seed round, "no one is pressuring us for revenue [. . .] revenue is not going to be our priority, its going to be proving that people love our product." To be able to demonstrate that prosumers 'love' the product, framed in the technical language of "engagement" and "retention," this entrepreneur tracked frequency of engagement metrics using Mixpanel, a mobile analytics service. He collected data continuously on user activity, to see how often the same users came back to the application day-to-day and week-to-week, data that he could include in pitches, demos, and meetings with potential investors. User retention and engagement were the important metrics in the particular case of his startup, based on the application he was building and the kind of funding he sought. At this stage, these data are not directly translated into a revenue model and the value of prosumer labor is not realized. Data in this case demonstrate evidence of users' 'love' (rather than being sold and translated into revenue), an affective measure indicative of the command of user-attention or the desire to return to a platform.

To understand the 'value' of data and prosumption in these cases, an explanation must be sought beyond the strictly economic. Yet, questions of affect, power, and subjectivity as explicated above by Zajc (2015) are of course not incidental to the question of labor and economic value (Hearn, 2010). As Laclau and Mouffe (1985: 68, my emphasis) note, "[l]abor-power differs from other necessary elements of production in that the capitalist must do more than simply purchase it; he [sic] must also make it produce labor."

They continue, "[a] large part of the capitalist organization of labor can be understood only as a result of the necessity to extract labor from the labor-power purchased by the capitalist." For Laclau and Mouffe, "extracting labor" from labor-power, or making labor-power actually produce labor, remains a process distinct from the purchase of labor-power. After purchasing labor-power, the capitalist still has to get the worker to do work, and to work in a particular way commensurable with the job at hand. While constant capital after purchase can be set to work immediately, and in a more or less expected and predetermined manner, variable capital, living 'human' labor, must be told how to work, how to conduct themselves while at work, and, perhaps most pertinently, must be convinced to continue selling their labor-power to the capitalist for less than its value. For Laclau and Mouffe, this direction, orientation, and discipline from the capitalist to the worker may incur an additional economic cost for the capitalist. Especially in the perceived or real absence of other employment options, the wage alone may provide enough incentive for an employee to work. Examples of this additional and directly quantifiable cost of getting the worker to work in an acceptable way, following the purchase of their labor-power, include common characteristics of work such as employee training, and the adoption of compliance policies and best management practices. But they may also include subtle ways of encouraging work that are more difficult to quantify, and that fall into an affective definition. These include the construction of inviting and 'leisurely' working environments (Ross, 2003); cultivating emotional forms of collegiality, identification, and empathy with one's coworkers and employers (Gill, 2011; Hochschild, 1983; McRobbie, 2002); and encouraging workers to conduct their social reproduction time in the office (Fuchs, 2014b).

To bring the example of prosumer activity in early-stage digital media platforms back to the insight from Laclau and Mouffe, we can conceptualize these media as the attempt, through generating systems that encourage affective attachments, in terms of 'social validation' and 'love' for a platform, to direct prosumer behavior. While prosumers generate data for a firm, that firm creates a social media platform to secure the continued interaction of users and generation of data, in order to eventually produce surplus-value without the necessity of the costly wage-relation. Yet, despite the absence of a wage, this form of prosumer orientation and digital discipline incurs a direct financial cost, since startup firms spend large amounts of personal, crowdfunded, or investor capital in the development of the digital media platform prior to (and often after) the generation of revenue. The value of data created by prosumers in these early stages is indicative of the firm's ability to command, direct, and retain user attention, and to get users to work in a particular way. Data are used as a form of evidence of the affective attachment prosumers show toward a product. Data are valued as evidence of 'love,' 'social validation,' 'retention,' and 'engagement,' not because (or not only because) they are indicative of present or future revenue. These data are evidence that the startup can compel, and reliably continue to compel users to contribute their labor-power to the firm, and eventually realize that additional surplus-value without the necessity of the wage function. The value of these data at these earlier stages is speculative in the sense that they provide a guarantee or promise of a financial payoff, under the assumption that the economic value of user contributions can be realized in the future.

In the political economy of digital media and Big Data production, it is imperative to pay close attention to how emotional and affective attachments to particular platforms are cultivated or curtailed. An affective attachment to an idea or activity is the willingness to repeat an interaction (Deleuze, 1988), to continue to form that attachment, and to cultivate an emotional proximity to that idea or activity, in this case, to continue producing data. This repetition is indicative of a form of appropriation or capture of particular kinds of behavior. Prosumption, at early stages, is not indicative of production in a Marxist sense, but is an initial orientation toward a working yet unremunerated activity that might provide revenue in the future. Social media use is not necessarily an example of a shift in the mode of production under late capitalism, but in Deleuze and Guattari's (1987) terms, demonstrates the processes by which production is able to become a 'mode' in the first place, through a process of the non-economic appropriation of user activity. As Lazzarato (2015) notes, it is inaccurate to conduct economic or other analysis through a linear reading of the capitalist process that neatly begins with production and ends with realization, since production requires and is predicated upon the circulation of capital. Capitalism is a circuitous, reciprocal process involving the appropriation or capture of particular behaviors through "financial flows that guarantee the subjective investment of desire" (Lazzarato, 2015: 138). The ability on the part of firms to demonstrate that users return to, are engaged in, or 'love' a product, while not necessarily indicative of economic value in and of itself, is indicative of the possibility of the affective mobilization of an active user-base for the production of surplus-value in the future. Big Data collection and production as an activity of prosumption, therefore, may not be a 'productive' activity from the point of view of economics, but may instead be a highly productive one when

articulated in terms of social power and as an apparatus of attention-capture.

Conclusion

In this paper I have sketched out preliminary observations on how the question of value can be understood in terms of 'prosumer'-generated Big Data. The concept of prosumption has been important, though has largely retained a economic and production-oriented focus which, while instructive, has obfuscated some of the broader concerns surrounding the production of Big Data, such as their ethics, validity for research, the forms of epistemology they encourage, and the affective structures of feeling they perpetuate. While not wishing to de-emphasize the importance of economic concerns, I have emphasized as well the affective value of Big Data, and, have sought to locate the role of this affective value in the realization of economic value. As I have argued, digital media, especially at its earlier stages, demonstrate efficacy as systems designed for the appropriation and circulation of user attention, or as an affective apparatus of capture, in addition to and alongside their function for the production, circulation, and realization of economic value.

Further anxiety in writing on prosumption relates to the question of whether social media users can be considered 'exploited.' Some have argued that exploitation is a difficult framework to apply to media participation since users appear to participate 'willingly' and 'voluntarily' (Arvidsson and Colleoni, 2012) and enjoy or even 'love' their participation online (Hesmondhalgh, 2010; Ritzer and Jurgenson, 2010). I have in this paper established a link between the creation of social desire for a service or 'capture' of user attention, the inability to negotiate the terms under which that service is used (Peacock, 2014) and the use of data to demonstrate to investors that value might later be extracted from the unpaid contributions of prosumers. In these cases, 'good feelings' associated with ambivalent affects such as 'love' and 'passion' may be better understood as directly indicative or constitutive components of coercion and an attachment to particular kinds of work under certain circumstances, rather than factors that contradict it (Ahmed, 2010; Cockayne, 2016; Weeks, 2011).

More broadly, emphasizing the affective value of Big Data and their production draws attention to the roles of individual and societal attachment. As others have noted, Big Data have a particular imaginative power that works almost in spite of their often-questionable epistemological value (boyd and Crawford, 2012; Gregg, 2015). Big Data accentuate utopian fantasies about perfectibility of calculation (Thatcher et al., 2016) and perpetuate the old, outdated, and oft-critiqued scientific belief that knowledge can be total, absolute, and apolitical (Haraway, 1991). Digital media too betray related fantasies regarding transparency, democracy, participation, and horizontality. These fantasies are not incidental to economic concerns, and showing how forms of desire and affect are imbricated in the political economy helps us to understand how particular work practices (and not others), unpaid or otherwise, become normalized, justified, and acceptable in neoliberal forms of capitalism. Therefore, in addition to economic analyses of Big Data production, what is needed is an examination of the systems and regimes through which users feel compelled to contribute content and how entrepreneurs and engineers attempt to create systems through which that content might be more easily elided from the user.

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Notes

1. The term 'prosumption' is commonly attributed to Toffler (1980) for whom it referred to the tendency for previously professional 'productive' economic functions to be undertaken by consumers in the home. While it is not a term that refers solely to social media use, this is the main valence in which I use the term in this paper.
2. I cannot disclose the names of the firms discussed in this section, since all are relatively small, each with only two or three employees. I thus will refer to each company by number and provide additional contextual information in footnotes. Company one is comprised of two co-founders developing a dating application.
3. Company two is a social media application with personal safety component and two employees.

4. Company three is a location-based social media application with three employees.

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